

**WHAT IS CLAIMED IS:**

1. A method for use by a GE-PON (Gigabit Ethernet Passive Optical Network) system which includes one OLT (Optical Line Terminal) and a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN (Optical Distribution Network), said  
5 method for controlling the OLT to allocate bandwidth to each of the ONUs according to a bandwidth request signal for transferring data of the ONUs comprising the steps of:

a) selecting a minimum bandwidth guaranteed for individual services requested by the ONUs from among an overall available bandwidth, and allocating the minimum bandwidth to the ONUs;

10 b) if a current available bandwidth is found in the overall available bandwidth after allocating the minimum bandwidth to the ONUs sending the bandwidth request signal, allocating bandwidths requested by the ONUs when the sum of the bandwidths requested by the ONUs is lower than the current available bandwidth, determining new request bandwidths associated with the ONUs upon receiving magnitude and weight information of  
15 individual queues from the ONUs when the sum of the bandwidths requested by the ONUs is higher than the current available bandwidth, and performing bandwidth allocation in proportion to the determined request bandwidths.

2. A dynamic bandwidth allocation method for a GE-PON (Gigabit Ethernet Passive Optical Network) system which includes one OLT (Optical Line Terminal) and a plurality  
20 of ONUs (Optical Network Units) connected to the OLT via an ODN (Optical Distribution Network), said method for controlling the ONUs to allocate a bandwidth allocated by the

OLT to queues of individual service classes according to a bandwidth request signal of individual service queues comprising the steps of:

a) allocating bandwidths requested by individual queues when an available bandwidth allocated by the OLT is larger than the sum of request bandwidths of individual queues sending the bandwidth request signal, and allocating a minimum guarantee bandwidth according to priority information of the service classes when the available bandwidth is less than the sum of request bandwidths of individual queues; and

b) applying weights of individual service classes to a remaining bandwidth created by allocation of the minimum guarantee bandwidth within the available bandwidth, determining new request bandwidths associated with the queues according to the weights of the service classes, and allocating the remaining bandwidth in proportion to the determined request bandwidths.

3. A dynamic bandwidth allocation method for a GE-PON (Gigabit Ethernet Passive Optical Network) system which includes one OLT (Optical Line Terminal) and a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN (Optical Distribution Network), said method for controlling the ONUs to allocate a bandwidth allocated by the OLT to queues of individual service classes according to a bandwidth request signal of individual service queues comprising the steps of:

a) allocating bandwidths requested by individual queues when an available bandwidth allocated by the OLT is larger than the sum of request bandwidths of individual queues sending the bandwidth request signal, and allocating a minimum guarantee bandwidth according to priority information of the service classes when the available

bandwidth is less than the sum of request bandwidths of individual queues; and

- b) firstly allocating a bandwidth to a queue having the largest request bandwidth in a prescribed range of a remaining bandwidth created by allocation of the minimum guarantee bandwidth within the available bandwidth, and finally allocating a bandwidth to a queue having the smallest request bandwidth after sequentially allocating bandwidths to other queues.

4. A dynamic bandwidth allocation method for a GE-PON (Gigabit Ethernet Passive Optical Network) system which includes one OLT (Optical Line Terminal) and a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN (Optical Distribution Network), said method for controlling the ONUs to allocate a bandwidth allocated by the OLT to queues of individual service classes according to a bandwidth request signal of individual service queues comprising the steps of:

- a) allocating bandwidths requested by individual queues when an available bandwidth allocated by the OLT is larger than the sum of request bandwidths of individual queues sending the bandwidth request signal, and allocating a minimum guarantee bandwidth according to priority information of the service classes when the available bandwidth is less than the sum of request bandwidths of individual queues; and

- b) firstly allocating a bandwidth to a queue having the highest priority in a prescribed range of a remaining bandwidth created by allocation of the minimum guarantee bandwidth within the available bandwidth, determining new request bandwidths associated with the remaining queues according to weights of individual service classes, and performing bandwidth allocation in proportion to the determined request bandwidths.

5. A GE-PON (Gigabit Ethernet Passive Optical Network) system comprising:  
an OLT (Optical Line Terminal);  
a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN  
(Optical Distribution Network);

5 means for selecting a minimum bandwidth guaranteed for individual services requested by the ONUs from among an overall available bandwidth, and allocating the minimum bandwidth to the ONUs; and

means for, if a current available bandwidth is found in the overall available bandwidth after allocating the minimum bandwidth to the ONUs sending a bandwidth request signal, allocating bandwidths requested by the ONUs when the sum of the bandwidths requested by the ONUs is lower than the current available bandwidth, determining new request bandwidths associated with the ONUs upon receiving magnitude and weight information of individual queues from the ONUs when the sum of the bandwidths requested by the ONUs is higher than the current available bandwidth, and  
10 performing bandwidth allocation in proportion to the determined request bandwidths.  
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6. A GE-PON (Gigabit Ethernet Passive Optical Network) system comprises:  
an OLT (Optical Line Terminal);  
a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN  
(Optical Distribution Network);

20 means for allocating bandwidths requested by a plurality of queues for a plurality of service classes when an available bandwidth allocated by the OLT is larger than the sum of request bandwidths of individual queues sending a bandwidth request signal, and allocating

a minimum guarantee bandwidth according to priority information of the service classes when the available bandwidth is less than the sum of request bandwidths of the individual queues; and

means for applying weights of individual service classes to a remaining bandwidth created by allocation of the minimum guarantee bandwidth within the available bandwidth, determining new request bandwidths associated with the queues according to the weights of the service classes, and allocating the remaining bandwidth in proportion to the determined request bandwidths.

10 7. A GE-PON (Gigabit Ethernet Passive Optical Network) system comprising:

an OLT (Optical Line Terminal);

a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN (Optical Distribution Network);

15 means for allocating bandwidths requested by a plurality of queues for a plurality of services classes when an available bandwidth allocated by the OLT is larger than the sum of request bandwidths of individual queues sending a bandwidth request signal, and allocating a minimum guarantee bandwidth according to priority information of the service classes when the available bandwidth is less than the sum of request bandwidths of individual queues; and

means for allocating a bandwidth to a queue having the largest request bandwidth in a prescribed range of a remaining bandwidth created by allocation of the minimum guarantee bandwidth within the available bandwidth, and finally allocating a bandwidth to a queue having the smallest request bandwidth after sequentially allocating bandwidths to

other queues.

8. A GE-PON (Gigabit Ethernet Passive Optical Network) system;

an OLT (Optical Line Terminal);

a plurality of ONUs (Optical Network Units) connected to the OLT via an ODN (Optical Distribution Network);

5 means for allocating bandwidths requested by a plurality of queues for a plurality of services classes when an available bandwidth allocated by the OLT is larger than the sum of request bandwidths of individual queues sending a bandwidth request signal, and allocating a minimum guarantee bandwidth according to priority information of the service classes when the available bandwidth is less than the sum of request bandwidths of  
10 individual queues; and

means for allocating a bandwidth to a queue having the highest priority in a prescribed range of a remaining bandwidth created by allocation of the minimum guarantee bandwidth within the available bandwidth, determining new request bandwidths associated with the remaining queues according to weights of individual service classes, and  
15 performing bandwidth allocation in proportion to the determined request bandwidths.